The *Blueprint for NAS Modernization* and the Role of the Aviation Community

Michael J Harrison
Acting Director, Architecture and System Engineering
Federal Aviation Administration
Washington, DC
Transportation Research Board
January 12, 1999

The *Blueprint for NAS Modernization*

- **Summary of the NAS Architecture**
- **Focused on capabilities producing user benefits**
- **Represents the commitment of the FAA**
  - **Implements Free Flight Concept of Operations**
  - **Balances sustainment and modernization**
  - **Fits within projected funding levels for capital investment**
  - **Content is configuration managed (CM)**
    - **Change is by consensus and recommendations to the FAA with appropriate Architecture assessments**
    - **Recommended changes require changes to the Concept of Operations or changes in priorities of user benefit capabilities**

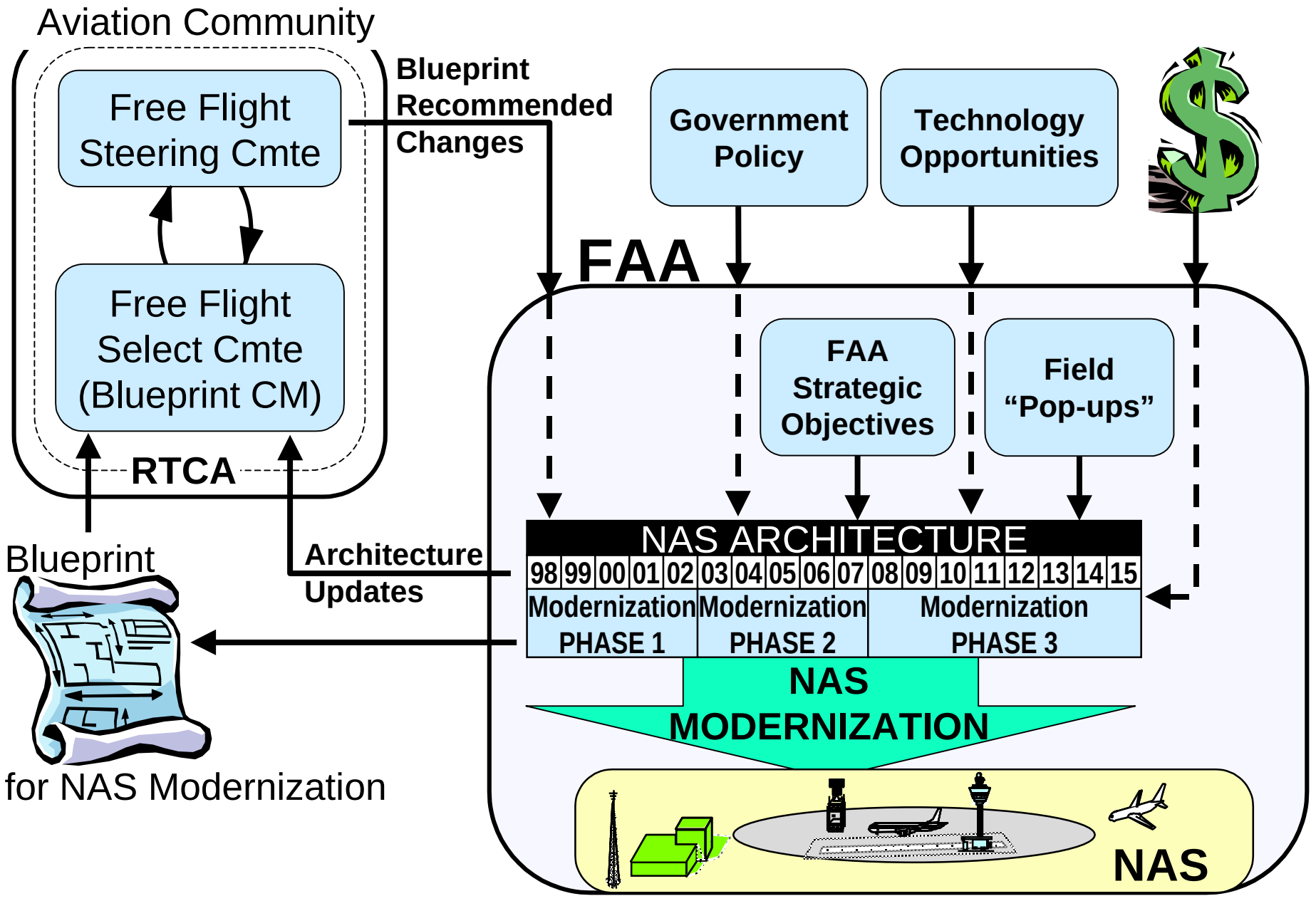
What does it mean to CM NAS Modernization capabilities?

- Disciplined process for managing the evolution of NAS operational capabilities based on consensus

- The path to a new capability focuses on the following:
  - Everything in the NAS Architecture starts with an Operational Concept
  - The description of the capabilities are derived from that Operational Concept
  - Details are defined in terms of Mechanisms and Segments
    - Relative priorities and transition steps
    - Schedules
    - Interdependencies

Capabilities change through consensus recommendations

Blueprint Configuration Management



There are multiple levels of CM

- **RTCA's role is at a strategic level in managing**
  - **proposed changes and recommendations to the capabilities defined in the FAA's *Blueprint for NAS Modernization***

- **The FAA applies configuration management to**
  - **the baselined NAS Architecture and architecture changes that occur with Joint Resource Council decisions**
  - **The NAS requirements and individual systems throughout their life-cycle**

RTCA would be expanding the current discipline applied to MASPS and MOPS to the work on achieving new capabilities linked directly to the NAS Architecture

The objectives of this Partnership:

- Improved understanding of the user community and FAA priorities on implementing modernization
- Improved communications on work in progress for a complex system-of-systems
- Improved understanding of the nature of changes and interdependencies within the Architecture
- Keep sight of the point of departure, the transition and the destination from the current NAS to implementation of the free flight concept of operations
- Consensus-driven change

Blueprint Contents

- NAS Modernization
- NAS Architecture
- Communications
- Navigation
- Surveillance
- Aviation Weather
- Avionics
- Free Flight Phase 1
- Operational Planning
- Airport Surface
- Departure / Arrival
- En Route / Oceanic
- NAS Evolution
- Partnership

Modernization Themes

- Collaboration with Aviation Community for National Growth and Enhanced Safety
- Accommodating Aviation's Growth and Replacing Aging Equipment
- Providing an Advanced, Integrated, and Safe Aviation System
- Improving Quality and Reliability through Integrated Digital Communications
- Using Satellite-based Services for Increased Accuracy, Operational Safety, and Airport Coverage
- Installing New Surveillance Technology and Expanding Coverage
- Providing Timely and Accurate Weather Data to Controllers and Pilots
- Using Satellite-based Navigation and Digital Communications to Improve Safety and Efficiency
- Deploying Advanced Automation Capabilities to Accelerate User Benefits and Assess Modernization Risks
- Sharing Information to More Effectively Manage Flight Planning with a Common View of Traffic Flow
- Moving from Gate to Runway with Greater Safety and Efficiency
- Optimizing Aircraft Sequencing with Improved Controller Tools
- Upgrading Automation to Share Data and Improve Operating Efficiencies

NAS Modernization

Accommodating Aviation's Growth and Replacing Aging Equipment

- NAS is aging, inefficient, and does not provide the predictability and flexibility necessary to meet today's aviation community demands
- FAA working in partnership with Aviation Community to define NAS Modernization
- Modernization goals are:
  - Safety
  - Accessibility
  - Flexibility
  - Predictability
  - Capacity
  - Efficiency
  - Security

Research Highlights

Research Highlights (1 of 2)

- Communications
  - Investigation of LEO / MEO usage for Air Traffic Services
- Surveillance
  - Investigate combination of terminal surveillance radar and doppler weather radar into single multi-purpose airport radar -- begin 2008 for 2018 deployment
- Aviation Weather
  - In-flight icing, aviation gridded forecast system, ground de-icing operations, convective weather, short-term ceiling and visibility predictions, turbulence, and wake vortices
- Avionics
  - Reduce cost of certification
  - Integration of Avionics and ground infrastructure to resolve technical and procedural risks

Research Highlights (2 of 2)

- Operational Planning
  - Identify improvements for collaborative information sharing and decision making
  - Identify innovative uses of data (i.e. Flight Object)
- Departure / Arrival
  - Develop a simplified format for displaying surface, terminal, and wake vortex information for controllers
  - Investigate improvements based on increased data sharing between airline operations centers and aircraft
- En Route / Oceanic
  - Evaluate integration of flight object and 4-D flight profiles into decision support systems

Backup Material on
Roles and Responsibilities

Role of the Free Flight Steering Committee

- Co-chaired by the FAA and the users
- Provides oversight on free flight and modernization
- Directs work of the RTCA Select Committee
- Reviews and considers recommendations of the RTCA Select Committee
- Develops consensus recommendations to the Administrator
- Approves the Joint FAA/Industry Concept of Operations

Role of the Free Flight Select Committee

- Supports the evolution of operational capabilities assigned by the Steering Committee and recommends changes to the *NAS Blueprint for Modernization* to the Steering Committee for consensus development

- Applies version control to documents and other products as recommendations are being developed

- Focuses on capability changes by providing capability descriptions, priorities, schedules, and interdependencies

- Members of the select committee are linking members who reach out to a broader segment of the aviation community on issues and changes in capabilities

Role of the RTCA Staff

- Communicate to a broad segment of the aviation community information on the NAS Modernization capabilities and their evolution
- Support in tracking proposed changes to the architecture baseline as developed by the select committee
- Represent the RTCA at FAA JRC meetings as appropriate

Role of FAA Architecture and System Engineering (ASD-100)

- Support the RTCA by providing architectural assessments on proposed changes and recommendations
- Provide expertise in validation of operational concepts
- Support consensus development on changes to the baseline architecture
- Coordinate RTCA recommendations and proposed changes to other FAA offices to help build consensus
- Provide configuration management and traceability of changes to the architecture and retain information provided by RTCA on recommended changes to the architecture